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IV.

EXPLORATIONS IN THE ROCKY MOUNTAINS AND THE HIGH PEAKS OF COLORADO.

By Prof. W. H. Brewer, of Yale College.

READ FEBRUARY 28, 1872.

Mr. President, Ladies and Gentlemen : It may be well to preface the subject that has been announced, that is, my own explorations in the Rocky Mountains, by some general considerations of this great mountain system of which they are but part. As you are aware, this mountain system which stretches along the western side of our continent is the grandest on earth, considered in its geographical extent, in its scenic aspect, in its economic importance to the world. Extending as it does from Cape Horn upon the south to the Arctic ocean on the north, bristling as it does nearly its entire length with volcanic peaks, extending into the cold regions of the north from the regions of the Tropics, having every variety of vegetation, it has concentrated in it all the various features we will find elsewhere in other mountain chains on the Globe. But that is not all. That is really the great store-house of the precious metals at the present time. Nearly all the precious metals of the world come from one or another portion of this great chain.

Stretching along the western coast of South America is a comparatively narrow chain — we call it the Andes. There we find the highest volcanoes on the earth. Then, sinking in height along the Isthmus, the continent shrinks in width, so that in one place from ocean to ocean it is only thirty miles wide, and in several places the altitude through gaps is not more than five or six hundred feet. At the gap between Virgin Bay, on Lake Nicaragua and the Pacific, it is but a litle more than four hundred. In fact, along that portion of the country, extending some 1,400 or 1,500 miles, there are numerous low gaps, so that no less than nineteen or twenty routes have been proposed for canals, and quite a good many railroad routes have been projected. North of the Isthmus of Tehuantepec this chain spreads out like a fan across Mexico, attaining its greatest width in the United States along about the fortieth parallel, or about where the Pacific railroad crosses it. North of this point the western members of it take a more northerly course, and the eastern members more north-westerly. It becomes narrower again, and, after passing on into British Columbia, the chains of the northern part have never been studied nor mapped. In Central America and Mexico there are many active volcanoes; but as we get further north within the limits of the United States, throwing out Alaska, there are more volcanoes, extinct, not active. There are no active volcanoes, in the popular sense of the word, anywhere in this mountain system in the United States, but there are a great many mountains that are extinct volcanoes, and which show signs of their volcanic action in a variety of ways, by hot springs and by steam vents. Lassen's Peak was smoking and steaming in 1856. Mount Shasta has one near its summit. I was told by the Indians that the Indian name, "Shasta," meant smoking. Mount Hood, Mount St. Helens and Mount Rainer are all of them not only extinct volcanoes, but showing in their old craters still signs of their activity in hot springs and steam vents. Along the northern portion of California and the western part of Idaho there are extensive overflows of lava. There is a single patch of lava in northern California which covers nearly 10,000 square miles. Mount Shasta, the highest point measured in the United States except one, is over

14,000 feet — the grandest peak in some respects in the United States. Volcanic materials have been piled up entirely since the cretaceous period. You take out of these rocks fossil shells marvellous in their perfection, so perfect that they still show the gloss upon their surface: *nacre*, as the conchologists call it.

Passing to the north of the mountain we find the same strata running through it. The whole of this mountain system, that is found within the limits of the United States, was formerly known under the name of the Rocky Mountains. I don't know who first used the name, or why it was used. Why they should be called Rocky Mountains I don't know. They are not rocky more than other mountains. Only thirty years ago we used to hear of the Rocky Mountains of California. Nuttall, the botanist, who visited that region in 1835 and 1836, spoke of them as the Rocky Mountains. Now, we no longer apply the name to any of the western mountains, and it is applied only to the extreme eastern portion of this great mountain system; for it is the eastern portion which forms the back bone of the Continent; and that is the portion we now generally call the Rocky Mountains.

There has long been a romantic interest attached to this very name; the height of the regions, the uninhabitable, inhospitable peaks, its fierce animals, its wilder and fiercer men; the great distance of some portions of these ranges from navigable waters — all have combined to throw around it a peculiar charm of romance.

I will say a few words about the other high peaks of the United States. I have hung up these diagrams. This one represents, nearly, the river system of that portion of the United States lying west of the ninety-ninth meridian. I have drawn on it the river systems, and simply the location of a few of the more marked high peaks. Now, as I have said, this portion, which is a few miles wide on the fortieth parallel, is a little narrower to the north and a little narrower to the south. This mountainous portion of the United States embraces an area of a little over a million square miles. The western members of this we call under the name of the Cascade Range, until it strikes the boundary of California, and then we call it the Sierra Nevadas. The eastern members of it we call the Rocky Mountains. The Sierra Nevadas are only broken through at the northern portion by the Columbia river. We can hardly call it broken through here at the south, because the Colorado passes down behind it. The Rocky Mountains pass down through here [indicating it on the map]. They drain everywhere; east into the Atlantic, and west into the Pacific. There is a popular belief that when you cross the Rocky Mountains you are in the great basin. It is not so. If you cross south of Fremont's Peak, you only get into the valley of the Green river. If you cross north, you get into the Columbia valley. West of these lines is another little range of mountains, which we call the Wasatch, which forms the eastern rim of the basin. The basin does not extend north of Utah and Nevada.

A few words more about the western chain or Sierra Nevadas. This is the grandest one in its scenery, and has also the highest peaks. All of the high peaks are extinct volcanoes. A few of them have been measured. First, on the north, is Mount Baker, which has never, as yet, been ascended. It has recently been reported by Prof. Davidson as 10,719 feet. I take this number from the newspapers containing his report, which he made before the California Academy of Natural Sciences, a short time ago. From the same authority we have it that Mount Rainer is 14,444 feet, measured trigonometrically, which is the most unsatisfactory way, unless it is measurement by boiling water on the summit. Geographers will understand what I mean. There are various difficulties in the way which I have not time to explain. We must know the height of the base, and it is very difficult to get a base near the mountain; but it seems to me the laws of refraction are not well understood. Certain it is that all our western mountains that have been thus measured have, with some rare exceptions, not proved anywhere near so high as they have been made by these means of estimation.

Mounts Baker, St. Helens and Adams have not been measured. Mount St. Helens was ascended this summer by one of Mr. King's party. Mr. Emmons, also, ascended Mount Rainer. The difficulty consists in getting to the base. You have to go through a very great distance of dense forests, with large amounts of fallen timber. Mount Hood has been measured. That was the mountain which was formerly called the "monarch of American mountains" — 16,000, 17,000 and 18,000 feet high, of which the latter number was by far the most popular belief; and, indeed, one called it 21,000 feet high. It was afterward measured by Lieut. Williamson, connected with the corps of engineers, who has spent some years in elaborating the laws of barometric pressure, and he made it only 11,225 feet high. It was measured again by one of Mr. King's party, last summer, and they made it almost precisely the same height. It was also measured by Prof. Collyer, of Oregon, and he made it almost precisely the same.

Passing into California, we have the high peak of Shasta, which I had the honor of measuring in company with Prof. Whitney, 14,441 feet high. South of this is Lassen's Peak, not so high, but probably commanding a better view than any other mountain in America. I was on the Peak twice, the second time passing ten hours on the summit. I went up in the night, so as to be there at sunrise. Knowing the topography, we took opportunity at sunrise to get bearings on the most distant points, which, afterward drawing a line from each of the most distant points around the horizon, encircled an area of more than 47,000 square miles. I know of no other point in America where so great an area can be seen at any one place. The mountain, however, is not very high as compared with others.

Then passing south we have Pyramid Peak and Wood's Peak, neither of them reaching quite to 11,000 feet. Then a great mass of peaks lying just back of Yo Semite, reaching 13,000 feet. As Mark Twain says, when you get to Yo Semite don't think you have got to the end of the scenery ; you are just on the edge of it. Yo Semite lies in the centre of the chain there, or the centre of the chain is in the centre of Yo Semite valley, almost within a mile of it. But by continuing your trip back of Yo Semite (there is a good trail, used by packers to get across the Yo Semite valley to Mono lake), you come to a point where travelers can reach a greater altitude than in any other place in California; and there is no other place where you can get so high with so little labor as on that trail on that peak. You will find the other mountains of California much too rough for comfort. But on this, even ladies, with good lungs and sound hearts — I speak physically — [laughter] can get to the top of Mount Dana, which is 13,227 feet high, with considerable ease. One little girl, only six years old, has made the ascent. I persuaded a cripple to ascend a mountain 12,000 feet high.

There you have a very extended view of scenery, embracing the western slope of the Sierras. You see the great central valley upon the west, and you may get views there extending vastly further than any you will find in the Rocky Mountains, with comparatively little fatigue. If any of you go to Yo Semite, don't be satisfied with that; but if you want to get a good view of the country, go upon the outside, look back, and see the grander peaks and snow-fields and forests lying back towards the crest,— Mount Dana, 13,227 feet, Mount Lyell, 13,217 feet, etc. Messrs. Gardner and King measured others in the vicinity not quite so high ; a little less than 13,000 feet, which I have not marked here on the map.

South of this group, I will remark, there is not a gap known less than 11,000 feet for 150 miles. St. Bernard, in Switzerland, which is called an exceedingly lofty pass, is only 8,200, while here is a chain where there is not a single pass below 11,000 feet for 150 miles. The chain culminates at this point, and here is the highest mountain in the United States, which we named for our chief, Prof. Whitney. Mount Tyndall, lying near it, is 14,380 feet high, and Mount Brewer 13,886 feet. Nobody has yet been upon the summit of Mount Whitney ; but Mr. King attained an altitude of 14,740 feet. In this cluster of peaks there are a dozen peaks above 14,000 feet. It is somewhat interesting to know that the lowest point in the United States is not far distant from Mount Whitney. The United States and California Boundary Commission got in there by mistake, and took barometric observations. The valley is probably 70 or 80 feet below the sea level. It takes its name from the fact that several emigrant trains which got in there have miserably perished.

The Sierra Nevadas are superior to the Rocky Mountains in scenery. You have there grander forests, greater fields of view. Of the mountains of the Great Basin I shall not attempt to speak. They have a scenery entirely their own. I have never ascended any of the higher peaks.

We will now consider the Rocky Mountains. There are enough mountain peaks there to satisfy the ambition of all the young explorers which the United States can produce for many years. While there are certain features in common, there is a marvelous difference in them. Each peak has a personality of its own. They are much alike in this. You have during the summer season a marvellously transparent, clear air, so that it offers no impediment often to the most distant view. You have, furthermore, a very large number of very high peaks. You have peculiar features of vegetation. But I might say that the most characteristic feature of any of these mountains is the vastness of the scene. Those of you who have visited Switzerland and been upon the high Alps, or upon the Alps which are not so high, the Rigi or the Faulhorn, for instance, know how enthusiastic tourists become. You go up there, and they say, "Why, that peak is forty miles away, and that one is fifty!" and you feel exhilarated and enthusiastic. But when you get upon the loftier peaks of the Rocky Mountains you accomplish it with much more fatigue. You have got to go a longer distance to get up there than you have to go in Switzerland, on account of the civilization that you find there. When you get to the top you have a vastly wider view. It is not only *impressive*, but *oppressive.* On the top of the Swiss peak I felt like jumping up and shouting, but upon the Rocky Mountains I felt like sitting down, and saying never a word. It is easy to see why this feeling should come over one when you have seen the two countries. I might say that while Switzerland embraces an area of 16,240 square miles this region embraces an area of 1,100,000 square miles. These figures, however, don't convey an accurate idea of the difference in vastness between the two regions. You don't appreciate it. I can show it in another and better way. I brought along the government map of this western region. It embraces the whole region west of Lake Superior. This is known as Warren's map. I now pin on that a little piece of black paper which represents the size of Switzerland, plotted on the same scale. As I said before, in round numbers one is 16,200 square miles, the other about 1,100,000. The various authorities differ by more than 150,000 square miles—nearly ten times the area of Switzerland.

But I am taking up too much time with these preliminaries.

Next is the Rocky Mountains — that is, the eastern chain. The earliest writers speak about it as not a continuous chain, but groups. If you read the old accounts of these hunters, or the missionaries — of Dr. Whitman, Dr. White or Dr. Parker — any of those persons, you will find they all speak of the groupy character of the mountains, the grouping of the peaks, and the passes between them ; but if we examine them on a grand scale, we will find there are two great groups. The first is the northern one, embracing several distinct and minor clusters. The other is this great group — the southern group. Of this northern group there has been, as yet, only one point measured. It was this point [indicating it on the map], a peak that was first ascended by Capt. Bonneville, I don't know how many years ago. It was pronounced more than 18,000 feet. It was called then Union Peak. Afterward it was ascended by Col. Fremont, and found to be 13,570 feet. It is in many respects the most interesting mountain of the whole chain. It is in a region that has vastly more snow than the southern Rocky Mountains. It is a peak that has been known longer. That group of peaks was described as far back as the days of Lewis and Clark. After Fremont ascended it, it went on the map as Fremont's Peak, and remained on all the government maps by that name until the time of the war, when Fremont, politically, was under a cloud for a little while, and then some of the government maps left off his name from the peak, and put on again the name of Union Peak. The later government maps have restored Fremont's name and put the name Union Peak to a peak some distance north-west in the same chain. What makes that mountain especially interesting is, it was then, and by all previous travelers, supposed to be the highest of the Rocky Mountains, and it was not known until the explorations of Dr. Parry, long afterward, that it was not the highest peak of the Rocky Mountains. It was a dogma of geographers that the greatest rivers rose on the highest land. Here, I am told, within a mile of each other, are the head waters of the Columbia, the Missouri and the Colorado. The three rivers rise and find their way to the Pacific through the

Columbia. Upon the north-east side rises a little river known as the "Wind River." From this point to this [indicating it on the map] is known as the Big Horn. Then the Yellowstone; next the Missouri; finally, the Mississippi. The Missouri river proper, under that name, does not extend to the Peak.

West of Fremont's Peak are three volcanic peaks — as far as I can ascertain, the most important volcanic peaks in the group. There are peaks which are supposed, by hundreds, to be higher, even, than Fremont's Peak, because they are sharper, and sharper peaks are generally estimated to be higher than broad ones. Near Laramie, the peaks are more rounded. Sandstones extend almost entirely across the chain. South of this gap, which you all know is where the Pacific railroad passes, we have this other large group of peaks lying in here [indicating it on the map], of which only a portion have been explored, while off in this direction is a great unexplored region absolutely unknown to geographers. Of this set of peaks there have been quite a number measured. Of the northern group but one, Fremont's Peak, has been measured. Let me remark here that that is the only peak above 13,000 feet that has ever been measured by any United States military officer. Up to this time twenty distinct peaks above 13,000 feet have their heights recorded and made public. Of these there has been only one measured by any military officer of the United States. Mr. King's party, although working under military authority, are civilians. They measured some other points more than that, but they have not, as yet, been made public. About six or seven years ago Dr. Perry, the botanist, from Davenport, Iowa—who is now down at San Domingo, by the way—alone, with his own resources, with his barometer on his back, traversed a portion of the Rocky Mountains here, and contributed by far the most important number of high altitudes that any person had as yet done. Taking these peaks in here [indicating it on the map], he estimated Long's Peak at 14,056 feet. Four years ago it was ascended by Mr. Powell, of Colorado fame, in company with Mr. Byers, of Denver. They took up a barometer, but did not, unfortunately, take complete observations so as to know its actual height; but Prof. Whitney calculated, from these imperfect observations, that it was about 14,050 feet, coming very near Dr. Parry's measurement.

There is a little peak north-west of this, known to hunters by the name of Velie's Peak, found to be 13,456 feet. This was measured by Dr. Parry. West of it is another peak, Mount Audubon, measured by Dr. Parry, and estimated to be 13,402 feet high. Next comes Parry's Peak, 13,133 feet high, and next Gray's Peak, 14,145 feet, or, as measured by Dr. Parry, 100 feet higher. A little further south is Mount Guyot, 13,223 feet, and Mount Rosalie, which is probably about 13,000 feet. Here is Mount Guyot, and here is a mountain commanding a most exquisitely beautiful view, known as Silverheels, which is 13,650 feet. Then comes Mount Lincoln, called the highest peak of the Rocky Mountains for a long while, 18,000 feet. Why this 18,000 feet should be applied to all mountains I don't know. You see Velie's Peak and the mountains of British Columbia,—they are all put down at 18,000 feet. Pike's Peak was first called 18,000 feet; Mount Shasta was also first called that. Near Mount Lincoln is a peak sometimes called Quandary Peak, sometimes McCollough's Peak, sometimes Ute Peak, and one man called it Hoosier Peak. South of Mount Lincoln the chain stretches along here quite high. We were on a peak here called Horseshoe Peak, from a peculiar amphitheatre in its side. The peak is 13,806 feet high. Down here on the west is this great isolated mass of Pike's Peak, 14,218 feet; then the Buffalo Peaks, not measured. We ascended two peaks here, in a region not before explored, which we named for our universities, the northern one Mount Harvard and the southern one

Mount Yale; the former 14,270 feet, the latter 14,078 feet.

I have enumerated now all the peaks whose heights are above 13,000 feet, which have been accurately measured and published to the world, in the United States. In other words, there are twenty peaks whose heights are above 13,000 feet, and, as I have enumerated them, ten above 14,000 feet.

I have already remarked that we have very few volcanic eruptions in the Rocky Mountains. Before I consider these peaks, a word more about the chain as a whole. And perhaps I cannot do better than to speak of the plains, for they are really a part of the mountains. This plain, which stretches 600 miles west of the Missouri, is not level. Its western edge is tilted up against the mountains. It is really a part of the mountains. If you don't believe it ask "Uncle Sam," who paid roundly for a road over a portion of these plains simply because it was high. The mountainous boundaries of the Pacific road commenced where, in height, they were mountains; in other respects, hardly so. If we pass west, on the Pacific road, these plains seem as vast as the seas. They are wonderfully interesting, but this interest does not wear. To me the impression was the same on the plains as on the sea; everything except sea sickness. Here is the deck of the ship. You see just out two or three miles, and that is all you do see. This visible horizon travels with you. You go out of the captain's door every day to find how your horizon is. You are a little excited one day to see a sail. It comes up higher and higher as you approach it. Finally you dip your flag to it, and you watch it until the hull goes down; then the sails, and finally, before night, it drops out of sight behind you. There are exactly the same effects on the Pacific road. There is one place where for more than forty miles there is not a bend in the track. In the spring it is green, in the summer it is ashen gray. You sit upon the back platform and you see these two shining bands of iron, which, as you pass rapidly onward, seem to come closer and closer together, until they almost meet. You see the telegraph poles, which also come nearer and nearer together. You see these same two shining bands of iron running on ahead, these same telegraph poles. This horizon travels with you until at last it is quite an item of excitement when you see a little lump coming up. You want to know what it is. As the train comes up you find it is quite large. As you approach still nearer you will find a large windmill to draw up water; and you find a little station, and alongside of that five or six soldiers to impress the Indians with the power of the United States army. But you leave the station, after you take up your water, and finally it sinks down below the horizon precisely as a ship does at sea. You follow this course hour after hour—all day. You wake up the next morning, and you are in a little rougher country. You get to Cheyenne. You see a long peak in the distance. You are told that is the Rocky Mountains, but you see no mountains, although in reality you are nearly 200 feet higher than Mount Washington. You see no mountains, except in the distance; supposing we are south of Denver, and you start north on the stage. There is a railroad up there now on which to go to Denver The road follows along up here [indicating it on the map]. The plains come up to the base of the mountains, and that portion of the Rocky Mountains is perfectly well defined. It seems to me that the plain comes up to the mountains, as plainly defined as the floor to this platform.

With the foot hills the mountain character instantly begins. There is scanty tree vegetation. You are traveling north from Denver toward Cheyenne. When you get along upon some of these places, along up here [indicating it on the map], you see north of you a black line lying against the horizon, which, as you go north, keeps looming up higher and higher. At last it seems like a gigantic railroad embankment which you can see thirty miles away. You have been watching the mountains all the time on the left. As you left Denver there they were rugged. Here are these great peaks with patches of snow on them glittering in the morning sun. North of Long's Peak they change in character. They are not so high. The tops are round. They seem to be made of softer material. They have yielded to rains. But just where they are getting the lowest you come to this great embankment, and that is just what it is, an embankment which stretches out between the North and South Platte. The plain rises to meet the mountains, and the mountains sink to meet the plain, until a man cannot tell when he leaves the plains and when he meets the mountain. "Uncle Sam" could not tell, when he paid for the railroad. As you are all aware, the engineering difficulties did not exist in the Rocky Mountains. The troubles of engineering lay in the mountains west, the Wasatch and Sierra Nevadas. The measurements I have spoken of were taken in 1869. Professor Whitney took out three or four students from the mining school of Harvard College. I went out with them. We were well supplied with instruments to do the work completely, and we did it as completely as though we were under pay. We made the survey as complete as government surveys are; and with the charm that there was no "red tape" about it, as we paid our own bills and were perfectly independent.

We took out six or seven barometers, four chronometers, a portable astronomical transit and a small transit, theodolites, and everything necessary. The scene of our explorations was the region of South Park and the head of the Arkansas Valley. We wished especially to examine South Park. San Louis Park, the largest of them all, lies further to the south.

Next, a word about South Park. That is the most beautiful of them all. Imagine an inland lake thirty miles wide and between forty and fifty miles long, perched up high among the mountains, 10,000 feet, with mountains about it on either side 13,000 and 14,000 feet high, and grand old glaciers coming down about it, the glaciers and rains wearing the mountain's side. Finally, the lake is filled up, leaving a grassy plain. The ridges which ran down into the lake become as would ridges running down into a grassy plain ; and that is what it is —an old lake filled up, nearly fifty miles long, with little tongues of ridge running down in it, with high mountains around about the outside, between it and the great plain a mass of rugged mountains made up of *gneissoid* rock, the streams which run through it cutting deep canons through it. That is the prettiest of the parks. Middle Park is neither so large nor so smooth. It is made up of round hills. This front range of foot hills is the range in which the most of the mining regions of Colorado are found, although further north the mines extend clear back of the crest. I dare say, when the country is fully explored, mines will be found scattered through as far as these metamorphosed rocks extend, and such rocks make up the most of the chain.

The tree vegetation is entirely of cone-bearing trees. You see pictures in the papers of that portion of the Rocky Mountains, and you find oaks and other deciduous trees there represented, but they do not exist in reality. Oaks, anywhere in that part of the Rocky Mountains, are unknown. No botanist has ever brought back so much as a leaf or an acorn from there. The only hard wood is a species of alder ; but in the mountains are the spruce and pine. The magnificent firs of California do not occur. They are made up of comparatively small trees. We have here pretty large forests, but not at all comparable with those we find in California. The upper edge of the timber line is well defined at about 11,000 feet. Some of you may be wanting to go out there on a pleasure trip, and would like to know about the game. Well, there is an abundance of game. The mountain buffalo is about extinct. They formerly ranged quite abundantly, but the miners have come and have driven them out of the country. I am now speaking only of that portion around the parks. Deer are quite abundant—an occasional elk. We saw three, I believe, in six weeks. Grizzly bears are a little more plenty, though nothing like so large as those in California. Those we saw I did not wish to disturb. Indians, ditto. There is a good deal of game there for those who are fond of shooting: turkey, grouse of various kinds, and the streams are filled with trout, looking at men as they go by and almost asking them to drop a line.

But if you have a taste for entomology, and are there in the season, vastly more abundant than all else are flies, more rapacious, biting to an extent — I dare not tell you how bad, setting your animals frantic, provocative of profanity among the men. They are *extremely* numerous. If you kill one it does no good, a thousand will come to his funeral, and hold a "wake" with music, and feasting upon the luckless victim. They are really the most serious drawback in the Rocky Mountains through a portion of the year.

A word now about one or two of these peaks in detail. Here is Mount Lincoln. Here is the park, numerous streams running down into it. When I spoke about oaks, I should have mentioned, that one deciduous tree or bush does grow there — the "trembling ash," as it is called there. And in these little groves is just the place to shoot deer. The Great South Platte takes a detour down to Pike's Peak, and rises here between Mount Lincoln and Quandary Peak. Just at the entrance of the park, following down the river, is a town; it used to be called "Fair Play." A great many miners went in there, and whether it was not considered just the best name I don't know, but it is now called "South Park City." All through the Rocky Mountains you have evidence of a grand system of local glaciers in former times, but they have entirely passed away, leaving only their *moraines*. I saw no *moraines* in Switzerland so finely developed as those in the Rocky Mountains. Passing up this valley you get a great many picturesque views. You come to "Buckskin," formerly "Buckskin Joe," and "Montgomery," two mining towns quite noted a few years ago for their mining wealth. I shall not describe those towns now. To use a California phrase, they are "played out." Buckskin Joe, which had its four or five thousand inhabitants, its theatres and banks, polled twenty-three votes at an election, just before we were there. There are still standing in the town of Montgomery seventy houses. It polled one vote, at the last election, and he had to go over to Buckskin to vote. The miners supposed mines of great wealth lay all around there, and so they built their houses. They began to dig holes, but finding that the anticipated nuggets were not there they abandoned the town. We camped in Water street, at the corner of Main street, and took possession of a store — a room as large as this — with a sign up, "positively no trust." We built our fire in front of the store to cook our provisions, for of course we took the proper equipments for camping. We did not take a tent up there, however; that was unnecessary. We went foraging around. Several fellows brought in chairs, and we soon had everything luxuriously. We found no provisions abandoned in that way. It was a curious place. Here a big sign, "Rocky Mountain Market;" there was the "Eldorado Hotel." Unlike most mountain places there were several saloons there. There was also a sign waving to and fro in the wind. It was a barber's shop; precisely whom to shave I don't know — miners rarely shave — perhaps eastern capitalists.

But although the town is deserted we found one house occupied by a most hospitable man, and from him we got all our information. The people who had built the town had built a good road up to it. I mean by that, passable to a wagon. You could ride your horses up to above timber line. We made the ascent with comparative ease. It is about 14,000 feet, and, being the highest of any there, it gives the widest view. There is a similarity of views from all these peaks, but no two are alike. From this we look down on one side on the South Park. We look over into the valley into the head waters of the Arkansas; but it is in this direction — north — that we have the grandest view, and the highest landscape. Some matters may interest naturalists here. On nearly all of these peaks, to me the most interesting feature of animal life was the grasshopper. They occur in enormous numbers; and when you ascend one of these peaks on a warm day, in the right season, you will find grasshoppers as far up as you can see. We were up there on a very warm day. I lay down on my back. Now I suppose most of you are aware that if you look up into the sky on a warm day and have the sun screened from your eyes by the corner of a building you can see insects in the air. Here I could see numberless crowds of grasshoppers in the air. They fly up on the mountain, and if they alight on the snow they get chilled and cannot get away; and when the snow disappears in the summer the carcasses are exposed, making a stench which is positively unpleasant. I was a little amused by one thing about it. On the coast of California we used occasionally to come across a dead whale. That smell once smelt will never be forgotten. It is very considerable and very peculiar. Now, I had as my companion Mr. Hoffman, who had been in California with me on my former trip, and the first time he came to the place he sniffed the air, and finally sung out, "dead whale!" and I don't know anything else to which I can compare the stench of these grasshoppers except dead whale. It had precisely the same flavor. If any of you go up the Rocky Mountains after smelling dead whale you will notice the similarity at once.

Bottle flies are quite abundant on the sunny slopes.

In some respects these mountains down here are more interesting [pointing to Mount Yale and vicinity]. They are more rugged. Arkansas Valley lies more than 1,000 feet below South Park. From what I have said you have no grand slopes in the Rocky Mountains like these the Sierra Nevadas, because the base is so high. At Mount Shasta you have 11,000 feet lying before you in grand slopes. Not so in the Rocky Mountains. You have no such slopes. It is very rare that you get a slope of more than 4,000 or 5,000 feet. Enough you may say for an ordinary climbing, but nothing like the California Mountains. I did not ascend Mount Harvard, but I was on Mount Yale, which is the sharpest, from Arkansas Valley, doing so after quite a fatiguing trail, and obtaining upon the whole rather a more picturesque view than from Mount Lincoln. The summit of these peaks is generally made up of splintered rocks that have been shivered by the frost. Between them you can occasionally find mosses growing as high up as 13,000 feet; snow banks lie around in large masses, differing in different years, for the amount of snow that falls is very capricious. Occasionally you come across patches of snow of a red color, tinged by a small plant which may occasionally be found in the snow in the Alps. I have examined it on numerous high peaks of the Rocky Mountains. Streaming down between Mount Harvard and Mount Yale is a stream which was once a glacier of magnificent form. I rode up alongside of one of the boulders on the *moraine*, and, dismounting, measured it. It was twenty-five feet high.

One feature of all these peaks is the stillness. What is there to make a sound up there? Nothing but the winds or the echoing sounds of the streams below. On a peak 14,000 feet high the barometer stands generally about eighteen inches. The breath comes quick and fast. The pulse is ninety, one hundred, one hundred and ten. The sensations are not so unpleasant as we generally hear them described. The principal difficulty is a lack of what you call wind, in climbing. To ascend a slope 2,000 or 3,000 feet high a man puffs considerably. It seems as if the thin air refused to sustain him. The *dangers* of mountain climbing it seems to me are erroneously exaggerated. I have ascended many high mountains, and yet I can tell of no narrow escapes. It is a very different story. It is a story of hard work ; unromantic hard work. Getting up a slope requires sometimes forty or fifty hours of hard work, sleeping out in snow and rain, eating provisions which you would not eat at Delmonico's, to say the least, and not always enough of them. It is unpoetical hard work. Richly paid you are, to be sure, when you get to the top, but I did not lose my scalp, I tumbled off no precipice, though I came pretty near it a few times.

But what is the most necessary for a successful mountain explorer is good, strong muscles, powerful lungs and a stout heart, because, strangely enough, persons are troubled with palpitation of their heart if it is at all affected. One needs, also, a certain amount of zeal. You must feel that it is going to richly repay you, or you will hardly do it.

There is one more peak that I will speak of. If any of you visit the Rocky Mountains, the best peak for the ladies to visit, and the most magnificent peak, with the least labor, is Gray's Peak. Here [pointing to the map] is the city of Denver. Near it comes in Clear creek. Along it are the most prosperous mines of Colorado, and the most prosperous mining towns. Georgetown lies about here, and in Georgetown you will find good hotels. Stages run every day. We had rooms with wash-stands in them, and looking-glasses ; why, it was quite palatial. From Georgetown it is only fifteen miles to Gray's Peak, and a wagon road runs up to above the timber line, to within three miles of the summit. At an elevation of over 11,000 feet there is Baker Mine, with houses where you can find accommodations — accommodations upon the floor; still, that is a considerable item. The first time we were on Gray's Peak we crossed in a snow-storm. In the Rocky Mountains we have a shower every afternoon, and attending them are the most marvellous atmospheric effects I have ever seen anywhere — the cloud effects. I have never seen anything to compare with it. The variety of cloud-colors and effects produced by cloud and storm is positively beyond description. When we first made the ascent of Gray's Peak, a fog came on and enveloped us before we got to the top. We were detained on the Peak four hours. We stood on the crest, or watershed, the waters running to the Atlantic on one side and to the Pacific on the other, from an elevation of 14,145 feet. During this snow-storm, which was really the afternoon shower in the valley 1,000 feet below us, we could hear the thunder all around us; then came back the echoes from below. It finally cleared away by the clouds sinking, thus leaving us above them. Below us it was snowing still, and the fierce wind caught the snow and whirled it over the Peak in our faces, and it went down into the fog, which resembled a seething caldron below. I tore off some oil-cloth to wrap my instruments in, and the next day made a second ascent. We were at the top by nine o'clock, and remained there six hours; and, I assure you, we were richly repaid. The Peak is about fifty or sixty miles from the plain. From the point we started, only three miles distant, we supposed it was perfectly cloudless, but on going to the top we found it was not cloudless. On looking out toward the plain, we saw clouds stretching away off to the distant horizon; but they were at a lower level than we were, for the plain lay about 9,000 feet below us. A portion of this 9,000 feet was occupied by clouds. However black clouds are below, they are always white on the top. They must be, for their tops are in the sunlight. They glisten like silver. To the north-west was, as you will perceive, Middle Park.

First it was filled with fog, and, as we looked down upon the top, it was like a great lake. After a time the fog went away, and we saw the rough hill and landscape within it; but by far the roughest portion of the landscape was between the south and west — in this direction [pointing it out] — extending off to an unknown distance into that *terra incognita*, nameless, untrodden, unknown peaks, some of them grand and lofty, glistening in the sun.

Sopris Peak is, possibly, the highest peak in the Rocky Mountains; but I don't know. We have no peak as high as Mont Blanc, with the single exception of Mount Shasta. All the peaks lie between 14,000 and 14,300 feet high. There is Mount Lincoln and Pike's Peak and Mounts Yale and Harvard that are that height, and a great many others that come up near those figures. When you are up on any one you think you are on the highest. Now, this is a thing which cannot be accidental: there must be a great law which regulates it. Sopris Peak many suppose to be the highest there; but no one has measured it. The Mount of the Holy Cross is perhaps 14,000 feet; but I do not know that. It takes its name from two ravines filled with snow, which have something the form of a cross, 1,000 feet long. As it came toward noon the storm began to come up, and you could see storms in the mountains over twenty miles away, and hear the distant thunders. Imagine the ocean suddenly frozen in a storm, and every wave magnified from its tiny height to many thousand feet, and every crest a snow bank, and you will have something the appearance of this wonderful mountain range to the west of this peak. You may ride a horse to the very top of it. You may sit upon your horse on the summit of this crest, 14,000 feet high. A miner by the name of Irving supposed there were valuable mines near the top of these peaks; and at the same time the man must have had a most realizing sense of the beauties of the place, for he constructed, at enormous labor and great expense, a good trail, by which you may ride to the very summit. He erected a tent upon the top of one of them, and shreds of canvas are still fluttering in the wind where he used sometimes to spend the nights, and could have all the beautiful landscape about him. We had to thank him for this trail, for it made the mountain accessible to us. The second time we were up there, it chanced to be Sunday, and among the visitors who came up were four ladies, two of whom had on cloth shoes. I mention it to show how accessible the peak is. From its top you can have a view which is hardly surpassed by any on the Rocky Mountains. You look down into both parks. You look out on the great plain. You see this little-known country, along the Grand river. I am fully convinced that when you reflect upon this and compare it with Switzerland, with all its scenic effects, you will conclude that it is not necessary to travel over foreign countries to see high mountains and grand scenery. We have shown you the size of Switzerland. It has but six peaks over 14,000 feet high. From Gray's Peak you will see more than that number with one glance of the eye. You perceive how accessible it is, attended with absolutely no danger. Why, you can ride a horse to the very summit, and buy the horse, for that matter, at not a very dear rate. When all this is appreciated, I am sure that those who have been inclined to voyage across the ocean, and visit other lands, will turn their attention to our own beautiful country, which has so much more of the sublime, so much more of that which delights the eye of man!